

NEW COSTA RICAN SPECIES OF *PHYLLOPHAGA* HARRIS
(COLEOPTERA: MELOLONTHIDAE: MELOLONTHINAE)

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Abstract.—Four new species of *Phyllophaga* are described from Costa Rica, *Phyllophaga kohlmanniana* and *P. picadoana* from the montane rain forest of the Monteverde Biosphere Reserve, Puntarenas, and *P. janzeniana* and *P. guanacasteca* from the tropical deciduous forests lowlands of Guanacaste. Drawings of male genital capsules, female genital plates, and tarsal claws are provided.

Resúmen.—Se describen cuatro especies nuevas de *Phyllophaga* procedentes de tres localidades en Costa Rica: *P. kohlmanniana* y *P. picadoana* del bosque lluvioso de montaña de la Reserva de la Biosfera Monteverde, Puntarenas; *P. janzeniana* y *P. guanacasteca* de los bosques tropicales caducifolios de las tierras bajas de Guanacaste. Se incluyen ilustraciones de las cápsulas genitales masculinas, de las placas genitales femeninas y de las uñas tarsales.

Key Words: *Phyllophaga*, May beetles, new species, tropical forests, Costa Rica

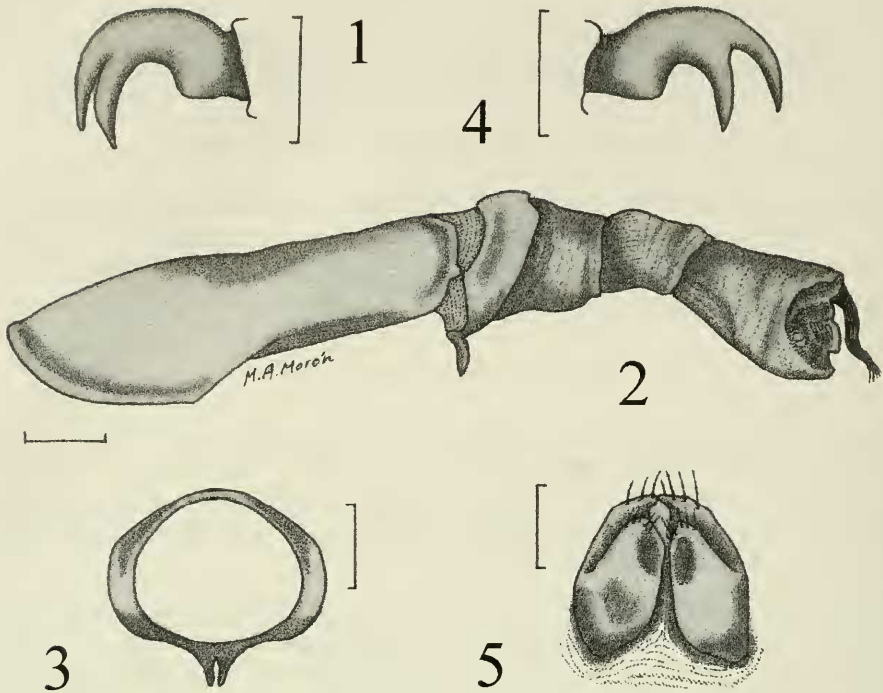
During curatorial work at the collection of INBio (1993–1999), we found specimens that represent four undescribed species of *Phyllophaga* from the provinces of Guanacaste and Puntarenas, Costa Rica. Males of these species have deep cleft or bifid tarsal claws, while the females have dentate tarsal claws. Using the criteria of Saylor (1942), Sanderson (1958), or Morón (1986), the males of these species key to the subgenus *Phytalus*, whereas the females key to the subgenus *Phyllophaga* (*s.str.*). A similar situation is present with other species from Mexico, such as *Phyllophaga ambigenus* (Bates) and *Phyllophaga mesophylla* Morón and Rivera (1992), both placed in the subgenus *Phytalus* based on the structure of the male tarsal claws and other characters. Awaiting for new advances in the supraspecific classification of the genus, we place

the presently described species as *incerta sedis*. In this paper, we describe males and females, address variation within the species, and present the precise distribution data for four new species of *Phyllophaga* from the montane rain forests and deciduous tropical forests in Costa Rica.

Acronyms used in the text are as follows: CAS, California Academy of Sciences, San Francisco, USA; INBio, Instituto Nacional de Biodiversidad, Costa Rica; MXAL, private collection M.A. Morón, Xalapa, México.

Phyllophaga kohlmanniana Morón and Solís, new species
(Figs. 1–5)

Description.—*Holotype male:* Head and pronotum shiny dark brown, with dense vestiture of short whitish setae; elytra, ster-



Figs. 1-5. *Phyllophaga kohlmanniana*. 1, Male protarsal claw, lateral view. 2, Genital capsule, lateral view. 3, Paramera, distal view. 4, Female protarsal claw, lateral view. 5, Female genital plates, ventral view. Scale lines = 1 mm, except figs. 1, 4 = 0.5 mm.

nites and pygidium reddish dark brown, slightly pruinose, completely covered with dense vestiture of uniform, whitish, short setae, that offer a macroscopic grayish, velvety appearance; mouth parts, tibiae and tarsi shiny reddish brown; coxae and femora partially pruinose. Clypeus $3.7 \times$ wider than long, anterior border curved, not sinuate, with elevated margin, surface slightly concave, with many uniformly distributed, deep, round punctures each provided with short, erect seta. Frontoclypeal suture widely sinuate and deeply impressed. Frons $1.6 \times$ wider than long, convex, finely punctate rugose, with short erect setae on entire surface. Antenna 10-segmented, with three segmented club, lamellae of 8th to 10th segments $1.6 \times$ longer than length of preceding six segments combined; segments 4 or 5 shorter than 3, with rounded prominences on anterior sides; segments 6 and 7 wider than long, with semiconical prominences on anterior sides. Frons $3.7 \times$ wider

than dorsal diameter of eye. Eye canthi long and wide, with 13-14 setae. Labrum bilobed, widely sinuated, with scattered slender setae. Mentum slightly concave, impunctate, with scarce slender setae, anterior border briefly sinuated, nearly straight. Pronotum $1.7 \times$ wider than long and $2.9 \times$ wider than frons. Pronotal disk shiny, but with basi-central area pruinose, total surface with deep, round punctures regularly separated by 1-2 diameters; lateral borders widely angulate, lateral marginal bead crenulate, with long, curved setae; basal bead complete, indicated by wide, deep sulcus; anterior angles straight, slightly prominent; posterior angles nearly straight, not prominent. Scutellum $1.5 \times$ wider than long, with many small punctures. Elytron $2.3 \times$ longer than wide, pruinose, densely and regularly punctate-setose; epipleural border narrow, extended along complete margin, slightly widened at $\frac{1}{6}$ and $\frac{5}{6}$ of its length, provided with scarce slender setae at anterior third,

dull or pruinose at middle and posterior thirds; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium pruinose, with dense setiferous punctures. Pygidium scarcely convex, pruinose, with round shaped, shallow rounded setiferous punctures, regularly distributed; apical margin with 16 long, slender setae; basal margin effaced. Pterosterna with long, dense, yellowish setae. Visible abdominal sternites II to IV slightly depressed at midline, with a noticeable shallow sulcus; sternite V slightly convex, pruinose, with dense setiferous punctures at middle; anal plate narrowed, transversely excavated, with elevated anterior and posterior margins, and 10 setae on apical border. Protibia nearly as long as protarsus (1:1.1), with external border tridentate, preapical spur acute, straight, longer than 2nd protarsomere (1.2:1). Mesotibia with one oblique, well marked, setiferous carina on external side; upper apical spur straight, narrow, and $1.4 \times$ longer than lower spur. Metatibia slightly shorter than metatarsus (1:1.2), with one oblique setiferous carina on external side; upper apical spur articulated, straight, sharply pointed, as long as basal metatarsomere, and $1.5 \times$ longer than lower spur; lower apical spur articulated, apex acute. Tarsomeres semicylindrical, elongate, with enlarged apex, some setae apically and two lines of setae along ventral side. Tarsal claws symmetrical, similar in all legs, deeply cleft, upper tooth shorter than lower tooth (Fig. 1). Genital capsule with short, narrowed parameres, dorsal and ventrally fused, ring shaped, apex with medium size, tooth-like projections (Fig. 3). Aedeagus very long, with preapical patches of spinules at sides and sclerotized dorsal support with sinuose flagellum (Fig. 2). Tectum (= phallobase) uniformly convex. Length of genital capsule from apex of parameres to border of basal piece: 6.8 mm. Total body length: 21.2 mm. Humeral width: 10.0 mm.

Allotype female: Similar to the male except as follows: antenna with segments 5

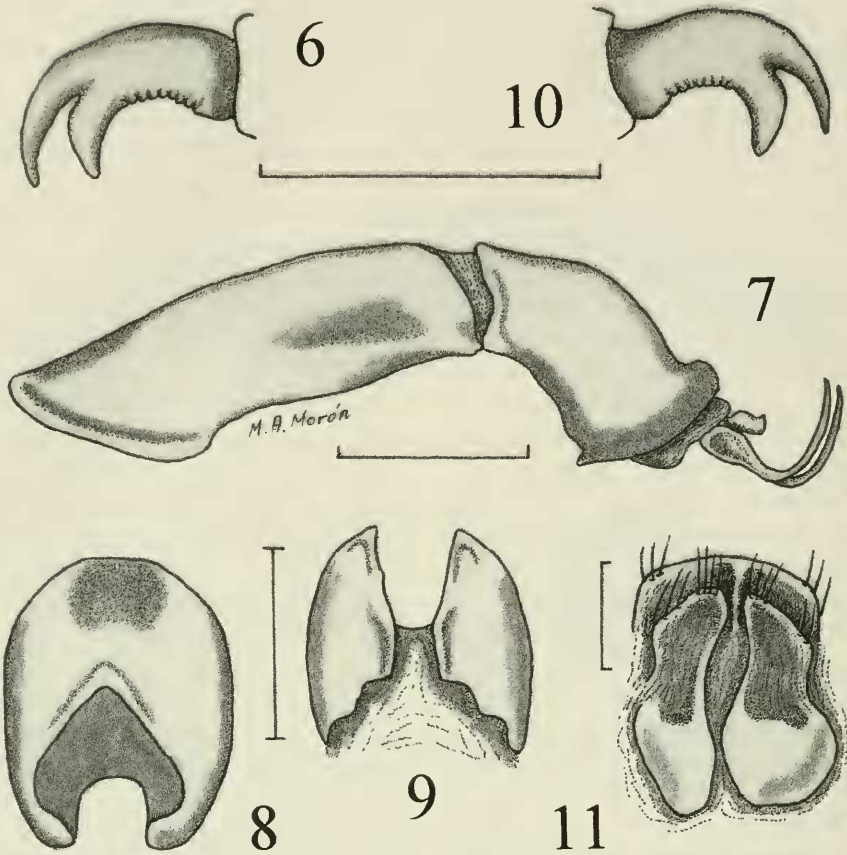
and 6 fused, and appearing 9-segmented. Visible abdominal sternites II to VI convex, with dense setiferous punctures; anal plate $1.8 \times$ longer than male anal plate, very convex, punctate, with 12 slender setae at the apical border. Meso- and metatibiae each with one oblique, strong, setiferous carina near middle and other vague carina on basal third of external side. Both apical spurs of metatibia articulated, wide, lanceolate and curved. Tarsal claws dentate, with long tooth near middle of ventral border (Fig. 4). Ventral genital plates well sclerotized, nearly symmetrical, elongated, with short setae at distal process; dorsal genital plates fused with ventral ones toward lateral sides, with acute apices directed mesad and setae on distal borders (Fig. 5). Total body length: 20.6 mm. Humeral width: 9.8 mm.

Variation.—Male: Similar to holotype except as follows: total body length: 19.8–21.5 mm, humeral width: 9.6–10.3 mm, pronotum of some specimens more reddish than holotype, other specimens with antennal club as long as preceding six segments combined. Female similar to allotype except as follows: pygidium with more setiferous punctures; total body length: 19.5–20.4 mm; humeral width: 9.6–9.8 mm.

*Type material.—*Described from 5 ♂, 4 ♀. Holotype ♂ INBio: Costa Rica: Puntarenas, Monteverde, La Casona, IV-92, 1,520 m, N. Obando. Allotype ♀ INBio: Costa Rica: Guanacaste, SW Volcán Cacao, Est. Mengo, II-89, 1,100 m, GNP Biodiversity Survey. Paratypes INBio, MXAL: same data as holotype (2 ♂ and 2 ♀); same data as allotype (2 ♂, 1 ♀).

*Type locality.—*La Casona, Estación Monteverde, province of Puntarenas, Costa Rica (aprox. $10^{\circ}30'N$; $85^{\circ}10'W$).

*Biological data.—*Specimens of *P. kohlmanniana* were collected at lights near cloud forests and tropical premontane forests located between 1,100–1,520 m. Phenology: February (4), April (5). Other species of *Phyllophaga* flying at the same time were *P. (Phyllophaga) tapantina* Morón



Figs. 6-11. *Phyllophaga janzeniana*. 6, Male protarsal claw, lateral view. 7, Genital capsule, lateral view. 8, Paramera, distal view. 9, Paramera, ventro-apical view. 10, Female tarsal claw, lateral view. 11, Female genital plates, ventral view. Scale lines = 1 mm, except figs. 6, 10, 11 = 0.5 mm.

and Solís, *P. (Phyllophaga) tilarana* Morón and Solís and *P. picadoana*, n.sp.

Remarks.—*Phyllophaga kohlmanni* does not belong to any species group described by Morón (1986). The structure of the male tarsal claws suggests placement in the subgenus *Phytalus*, but the form of the female tarsal claws indicates placement in the subgenus *Phyllophaga* (*s.str.*), as is known for *P. ambygenus* (Bates) and some other Mexican and Central American species. By the color, vestiture, body size, length of tarsi, and form of clypeus is similar to *P. (Phytalus) zeteki* Saylor, 1942, described from Barro Colorado Island, Panama, but the shape and details of the male genital capsule (Fig. 2), sculpture and ves-

ture of the sternites, shape of tarsal claws (Fig. 1) and proportions of antennal segments will aid in the recognition of this new species.

Etymology.—This new species is dedicated to our friend, Dr. Bert Kohlmann, whose enthusiastic devotion to the study of the scarab beetles of Mexico and Central America is well known to coleopterists and also to people interested in insect ecology and biogeography.

***Phyllophaga janzeniana* Morón and Solís, new species**
(Figs. 6-11)

Description.—*Holotype male*: Clypeus, frons and pronotum shiny dark reddish

brown; elytra and pygidium shiny reddish brown, without macroscopic vestiture; mouth parts, sterna and legs shiny testaceous reddish brown. Clypeus $3.6 \times$ wider than long, anterior border rounded, not sinuate, with elevated margin, surface slightly concave, with some wide, deep, coarse, round punctures without microscopic setae. Frontoclypeal suture sinuate and vaguely impressed. Frons $2.0 \times$ wider than long, convex, coarsely punctate rugose, with transverse keel on anterior half and some medium size setae at sides and minute setae scattered on the posterior half of disk. Antenna 9-segmented, with 3 segmented club, lamellae as long as the length of preceding 5 segments combined; 5th segment longer than 4 or 3; segment 6 compressed with semiconical anterior process. Frons $3.3 \times$ wider than dorsal diameter of eye. Eye canthi long and wide, with 9–10 setae. Labrum widely concave, slightly bilobed, with scattered slender setae. Mentum slightly concave, impunctate, with scarce, slender setae, anterior border briefly notched. Pronotum $1.6 \times$ wider than long and $2.9 \times$ wider than frons. Pronotal disk shiny, with deep, coarse umbiliform punctures irregularly separated by 1–3 diameters; lateral borders widely angulate, lateral marginal bead widely crenulated, with scattered, long, slender setae; basal bead vaguely indicated by punctures, mainly toward the sides; anterior angles straight, prominent; posterior angles widely obtuse, rounded. Scutellum $1.3 \times$ wider than long, with some irregular punctures. Elytron $2.8 \times$ longer than wider, shiny, densely rugo-punctate; epipleural border very narrow, extended along complete margin, provided with some scattered short setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium glabrous, with distal half nearly shiny and basal half slightly pruinose, with sparse umbiliform punctures. Pygidium moderately convex, shiny, glabrous, coarsely rugo-punctate; apical margin with 14 long, slender setae; basal margin effaced medially.

Pterosterna with medium size, moderately dense, yellowish setae. Visible abdominal sternites II and IV slightly convex, nearly polished and glabrous toward the midline; sternite V convex, shiny, irregularly rugo-punctate with scarce, scattered setae at middle; anal plate narrowed, transversely concave, irregularly punctate, anterior and posterior borders elevated, with some slender setae. Protibia slightly shorter than protarsus (1:1.2), with external border tridentate, preapical spur acute, nearly straight, as long as 2nd protarsomerus. Mesotibia with one oblique, sharp setiferous carina on external side; upper apical spur straight, narrow, and $1.1 \times$ longer than lower spur. Metatibia nearly as long as metatarsus, with one oblique, sharp setiferous carina on external side; upper apical spur articulated, angulated, sharply pointed, $1.2 \times$ longer than basal metatarsomere, and $1.1 \times$ longer than lower spur; lower apical spur articulated, with acute apex. Tarsomeres semicylindrical, elongate, with enlarged apex, some setae apically and two lines of setae on ventral side. Tarsal claws symmetrical, similar in all legs, widely and deeply cleft, upper tooth nearly as long as lower tooth, posterior ventral border slightly serrated (Fig. 6). Genital capsule with medium size parameres, dorsally fused, elongated with apex expanded and curved toward the middle line (Figs. 7–8); ventrally the paramera are not fused (Fig. 9). Aedeagus long, with a preapical dorsal sclerotized plate that support a pair of long curved spine-like sclerotized structures (Fig. 7). Tectum uniformly convex. Length of genital capsule from apex of parameres to border of basal piece: 3.7 mm. Total body length: 11.9 mm. Humeral width: 5.0 mm.

Allotype female: Similar to the male except as follows: anterior angles of clypeus more wide and rounded, expanded; antennal club as long as the length of four preceding segments; pronotum with anterior angles more prominent and lateral bead noticeably crenulate. Visible abdominal sternites II to IV convex, with scattered seti-

ferous punctures; sternite V more long and convex; anal plate 2 × longer than male anal plate, convex, punctate, with 10 slender setae near the posterior border. Pygidium with central part of disk slightly flattened. Both apical spurs of metatibia slightly curved with the apex rounded. Tarsal claws with upper tooth slightly shorter than ventral one (Fig. 10). Ventral genital plates with basal half well sclerotized and distal part membranous, sclerotized only at borders, slightly asymmetrical, basally rounded, elongated to apex, with some setae on border; dorsal genital plates poorly sclerotized, fused medially, with some setae at each side (Fig. 11). Total body length: 11.2 mm. Humeral width: 5.2 mm.

Paratype variation.—Male similar to holotype except in total body length: 10.8–11.8 mm, humeral width: 4.8–5.2 mm, pronotum and elytra of some specimens darker than holotype, other specimens with frontal transverse carina more or less accentuated. Female similar to allotype except as follows: pronotum, elytra and pygidium with more or less punctures; total body length: 10.8–11.5 mm; humeral width: 5.0–5.4 mm.

Type material.—Described from 8 ♂, 10 ♀. Holotype ♂ INBio: Costa Rica: Guanacaste, 12 km SE La Cruz, Cerro El Hacha, Casa Oeste, VI-87, 300 m, GNP Biodiversity Survey. Allotype ♀: same data as holotype (INBio). Paratypes CAS, INBio, MXAL: same data as holotype (4 ♂, 1 ♀); Guanacaste, P.N. Rincón de La Vieja, Est. Las Pailas, 1/22-VII-92, 800 m, D. García (3 ♂, 8 ♀).

Type locality.—Cerro El Hacha, 12 km SE La Cruz, province of Guanacaste, Costa Rica (approx. 10°58'N; 85°32'W).

Biological data.—Specimens of *P. janzeniana* were collected at lights in tropical deciduous forests located between 300–800 m. Phenology: June (7), July (11). Other species of *Phyllophaga* flying at the same time were *P. (Chlaenobia) scabripyga* (Bates), *P. (Phytalus) obsoleta* (Blanchard),

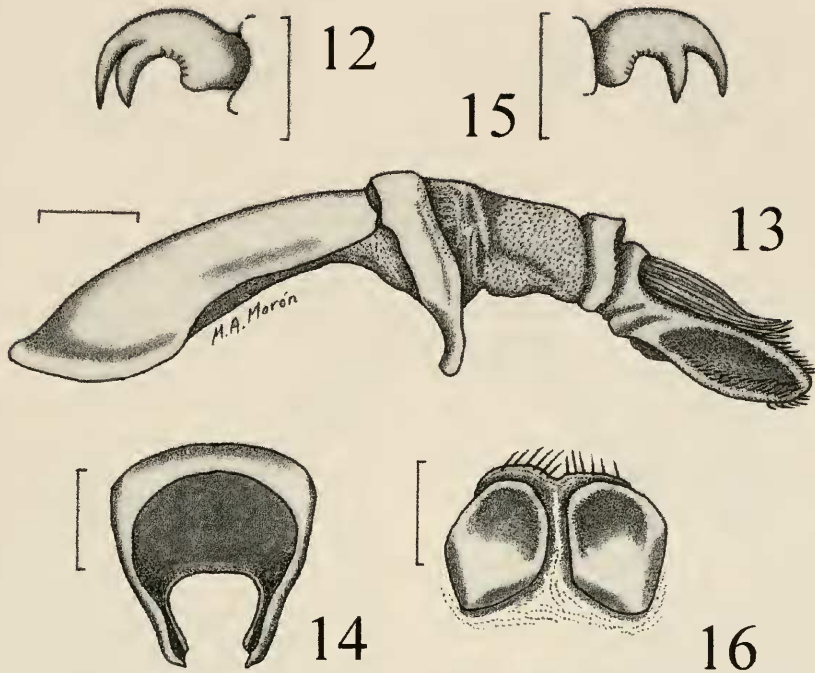
P. (Phyllophaga) elenans Saylor and *P. (s.str.) hondurasana* Moser.

Remarks.—*Phyllophaga janzeniana* does not belong to any species group proposed by Morón (1986). It may be related to *P. soctona* Morón from Chiapas, México, which is also a small species with frontal transverse carina, 9-segmented antenna and similar tarsal claws, but the shape and details of the male genital capsule (Figs. 7–8) and female genital plates (Fig. 11) are very different. Each paramere of *P. soctona* have two large, apical teeth, and dorsal genital plates of female are not fused medially.

Etymology.—This new species is dedicated to Dr. Daniel H. Janzen, whose interest in the study and conservation of tropical forests, mainly in the Guanacaste area, is well known.

***Phyllophaga picadoana* Morón and Solís, new species**
(Figs. 12–16)

Description.—*Holotype male*: Head, pronotum and pygidium shiny dark reddish brown; with sparse vestiture of short to long setae; mouth parts, sterna and legs shiny reddish brown. Clypeus 3.2 × wider than long, anterior border shallowly and widely sinuated, with margin elevated, surface nearly flat, with large, shallow, round punctures and some scattered short setae. Frontoclypeal suture fine, vaguely indicated by a wide, shallow sinuate sulcus. Frons 1.7 × wider than long, convex, coarsely punctate rugose, covered with short to medium size slender setae. Antenna 10-segmented, with 3-segmented club, lamellae 2 × longer than length of preceding 5 segments combined. Frons 4.1 × wider than dorsal diameter of eye. Eye canthi long and wide, with 7–8 setae. Labrum widely sinuate, slightly bilobed, with scattered slender setae. Mentum slightly convex, impunctate, with few slender setae, anterior border shallowly and widely sinuated. Pronotum 1.7 × wider than long and 3 × wider than frons. Pronotal disk shiny, with shallow, round shaped, large setiferous punctures irregular-



Figs. 12–16. *Phyllophaga picadoana*. 12, Male protarsal claw, lateral view. 13, Genital capsule, lateral view. 14, Paramera, distal view. 15, Female protarsal claw, lateral view. 16, Female genital plates, ventral view. Scale lines = 1 mm, except figs. 12, 15 = 0.5 mm.

ly separated from one another by 1–3 diameters; lateral borders widely angulate, lateral marginal bead slightly crenulated, mainly toward basal half, with scattered, long, slender setae; basal bead erased, only with shallow sulcus, mainly toward sides; anterior angles acute, prominent; posterior angles slightly obtuse, not prominent. Scutellum $1.6 \times$ wider than long, with 10 rounded punctures. Elytron $2.4 \times$ longer than wide, densely punctate-rugose, mostly shiny, except the preapical area and distal half of the lateral borders that have vague pruinose vestiture; epipleural border moderately narrowed, extended along complete margin, provided with scattered short, slender setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium shiny, with dense setiferous punctures. Pygidium moderately convex, shiny, rugose, with round, shallow setiferous punctures irregularly distributed; apical margin with 18

long, slender setae; basal margin effaced medially. Pterosterna with long, dense, yellowish setae. Visible abdominal sternites II and IV slightly depressed, polished and nearly glabrous at the midline; sternite V convex, with a patch of granules and erect short setae on middle and with a wide, shallow transverse sulcus before posterior border; anal plate slightly concave, vaguely furrowed at middle with some erect, medium size setae and anterior and posterior borders slightly elevated. Protibia slightly shorter than protarsus (1:1.2), with external border tridentate, preapical spur acute, nearly straight, slightly longer than 2nd protarsomerus (1:1.2). Mesotibia with one oblique, sharp, setiferous carina on external side; upper apical spur straight, narrowed, as long as the lower spur. Metatibia slightly shorter than metatarsus (1: 1.2), with one oblique, sharp, setiferous carina on external side; upper apical spur nearly lanceolate, curved, with rounded apex, as long as basal

metatarsomere, and $1.4 \times$ longer than lower spur; lower apical spur articulated, with rounded apex. Tarsomeres semicylindrical, elongate, with enlarged apex, some setae apically and two rows of setae with a fine longitudinal keel in middle of ventral side. Protarsomeres 1–3 with subapical short spines. Tarsal claws symmetrical, similar in all legs, deep cleft, upper tooth as long as lower tooth, with middle of ventral border finely serrate (Fig. 12). Genital capsule with proportionately short parameres, dorsally fused, apical thirch canaliculated by inner side (Fig. 14). Aedeagus large, with wide apical patches of spinules and dorsal preapical tuft of strong setae on a wide sclerotized support (Fig. 13). Tectum uniformly convex. Length of genital capsule from apex of parameres to border of basal piece: 4.1 mm. Total body length: 17.1 mm. Humeral width: 7.8 mm.

Allotype female: Similar to male except as follows: elytra with long erect setae near scutellum and toward apex. Pygidium less convex and rugose. Visible abdominal sternites II to V convex, with scattered setiferous punctures; anal plate convex, punctate, with many slender setae. Apical spurs of metatibia wide, lanceolate and curved. Tarsal claws with preapical tooth on ventral border, nearly as long as apical tooth, with part of ventral border serrate (Fig. 15). Ventral genital plates slightly sclerotized, nearly symmetrical, with apical border rounded (Fig. 16). Total body length: 17.3 mm. Humeral width: 8.1 mm.

Paratype variation.—Male similar to holotype except in total body length: 17.0–17.4 mm, humeral width: 7.6–7.9 mm, dorsal vestiture of some specimens less dense than holotype, other specimens with antennal club 1.8 – $2.1 \times$ longer than length of preceding five segments combined. Specimens from Chirripo have a darker color, distal half of paramera less canaliculated and have a wide shallow concavity on the dorsal part of parameral base. Female similar to allotype except as follows: elytra and pygidium with more or less setiferous punctures;

total body length: 16.8–17.3 mm; humeral width: 7.9–8.1 mm.

Type material.—Described from 10 ♂ and 8 ♀. Holotype ♂ INBio: Costa Rica: Puntarenas, R.B. Monteverde, La Casona, III-92, 1,520 m, N. Obando. Allotype ♀ INBio: same data as holotype except III-1994. Paratypes CAS, INBio, MXAL: same data as holotype (5 ♂); same data as allotype (2 ♂, 3 ♀); Cartago, Turrialba, Chirripo, Gran de Oro, IX-92, 1,120 m, P. Campos (2 ♂, 4 ♀).

Type locality.—La Casona, Reserva Biológica Monteverde, province of Puntarenas, Costa Rica (approx. $10^{\circ}30'N$; $85^{\circ}10'W$).

Biological data.—Specimens of *P. picadoana* were collected at lights near montane tropical forests and coffee plantations located at 1,120–1,520 m. Phenology: March (12), September (6). Other species of *Phyllophaga* flying at the same time were *P. (Phyllophaga) tilarana* Morón and Solís, *P. (s.str.) tapantina* Morón and Solís and *P. kohlmanniana* Morón and Solís.

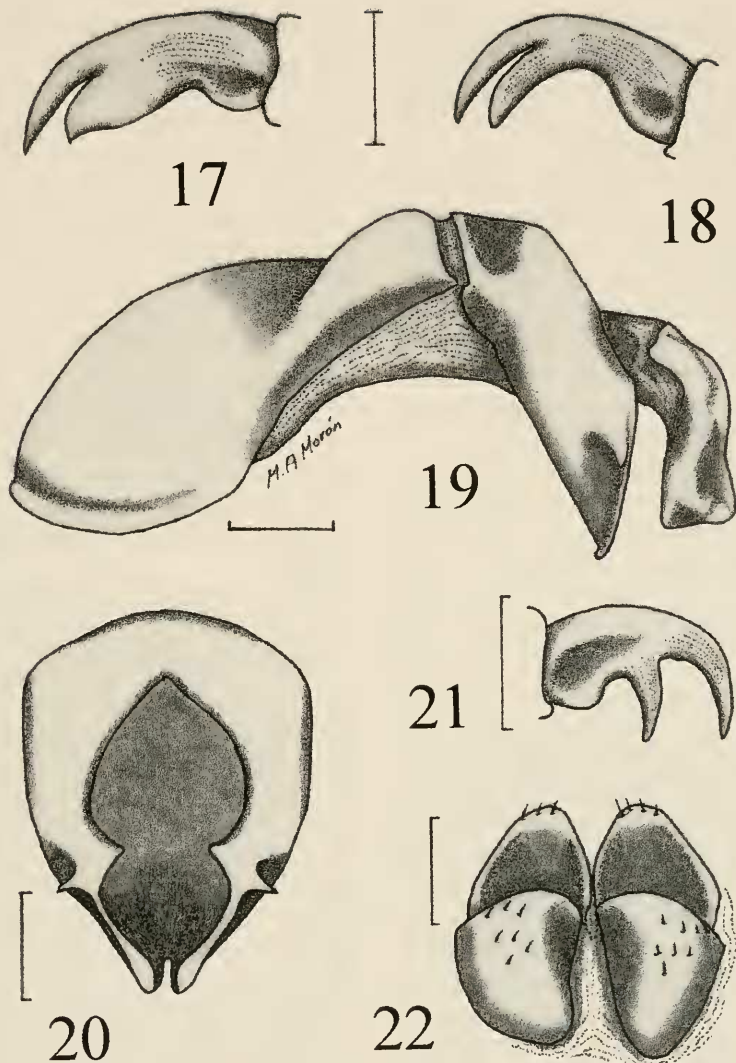
Remarks.—*Phyllophaga picadoana* does not belong to any species group proposed by Morón (1986). Externally this species resembles *P. (Phyllophaga) brevidens* Bates and allies, but the male and female tarsal claws of *P. brevidens* have a small tooth at the middle of ventral border, each paramere is deeply bifurcate and the aedeagus do not present wide apical patches of spinules.

Etymology.—The name of this new species is dedicated to the memory of the former Costa Rican biologist, Dr. Clodomiro Picado Twilight, who devoted much of his life to the study of animals, tropical ecology and natural richness of that country.

Phyllophaga guanacasteca Morón and Solís, new species

(Figs. 17–22)

Description.—*Holotype male*: Head, pronotum and elytra dark reddish brown with dense pruinose greyish vestiture; mouth parts, pygidium and legs shiny reddish brown; sternites light reddish brown



Figs. 17–22. *Phyllophaga guanacasteca*. 17, Male protarsal claw, lateral view. 18, Male hind tarsal claw, lateral view. 19, Genital capsule, lateral view. 20, Paramera, distal view. 21, Female protarsal claw, lateral view. 22, Female genital plates, ventral view. Scale lines = 1 mm, except figs. 17, 18, 21 = 0.5 mm.

with fine pruinose vestiture. Clypeus $3.4 \times$ wider than long, anterior border wide and deeply sinuate, with elevated margin, surface slightly convex, with many uniformly distributed, shallow large punctures, without setae. Frontoclypeal suture sinuate and deeply impressed. Frons $1.4 \times$ wider than long, convex, densely punctate, without setae. Antenna 10-segmented, with 3-segmented club, lamellae $1.3 \times$ longer than length of preceding 6 segments combined.

Frons $2.5 \times$ wider than dorsal diameter of eye. Eye canthi long and wide, with 9–11 setae. Labrum bilobed, widely sinuated, with scattered slender setae. Mentum slightly convex, impunctate, with few slender setae, anterior border nearly straight. Pronotum $1.6 \times$ wider than long and $2.9 \times$ wider than frons. Pronotal disk pruinose, with shallow, round small punctures regularly separated from one another by 2–4 diameters; lateral borders widely rounded, lateral

marginal bead entire, with 2–3 scattered slender setae; basal bead indicated by punctures, mainly toward sides, where shallow sulcus are also indicated; anterior angles straight, slightly prominent; posterior angles obtuse, slightly prominent. Scutellum $1.5 \times$ wider than long, scattered small punctures. Elytron $2.6 \times$ longer than wide, pruinose, uniformly punctate with some interstriae slightly elevated; epipleural border narrow, extended along complete margin, provided with some scattered short setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium pruinose, with uniform round, small punctures. Pygidium convex, shiny, with round, shallow punctures irregularly distributed; apical margin with 14 long, slender setae; basal margin effaced medially. Pterosterna with medium size, moderately dense, yellowish setae. Visible abdominal sternites II and III slightly depressed, pruinose, with small, black, granules at midline; sternite IV with dentiform irregular black granules near posterior border; sternite V with rounded area scarcely prominent at middle, covered with fine rugosities, granules and short setae; anal plate narrowed, slightly convex, with some short setae near midline and 6 slender setae on apical border. Protibia shorter than protarsus (1:1.8), with external border tridentate, but basal tooth very reduced; preapical spur acute, nearly straight, shorter than 2nd protarsomerus (1:2.2). Mesotibia with one oblique, setiferous carina on external side; upper apical spur straight, narrowed to the apex, and $1.8 \times$ longer than lower spur; lower spur with truncated apex. Metatibia shorter than metatarsus (1:1.3), with one oblique, setiferous carina on external side; upper apical spur straight, sharply pointed, slightly longer than basal metatarsomere (1.2:1), and $1.9 \times$ longer than lower spur; lower apical spur articulated, curved, with rounded apex. Protarsomeres 1–4 slightly concave by ventral sides, with lateral rows of setae. Meso- and metatarsomeres semicylindrical, elongate,

with enlarged apex, some setae apically and two lines of setae on ventral side. Protarsal claws slightly asymmetrical, deeply cleft, upper tooth longer and narrower than lower tooth (Fig. 17). Meso- and metatarsal claws symmetrical, deeply cleft, with upper tooth slightly longer than lower tooth (Fig. 18). Genital capsule with long parameres, dorsally fused, with preapical tooth-like projections on the external and internal borders (Figs. 19–20). Aedeagus short, with preapical, large, sclerotized asymmetrical plate (Fig. 19). Tectum with two large latero-distal rounded prominences (Fig. 19). Length of genital capsule from apex of parameres to border of basal piece: 5.9 mm. Total body length: 19.1 mm. Humeral width: 7.9 mm.

Allotype female: Similar to male except as follows: clypeal disk with more deep punctures; antennal club shorter than length of five preceding segments (1:1.3). Pygidium smaller, slightly convex, with more punctures, mainly toward apex. Visible abdominal sternites II to IV convex, with scattered setae; sternite V slightly longer than the IV segment, with more setae; anal plate convex, punctate, with 30 slender setae. Meso- and metatibiae each with one oblique, strong, setiferous carina on external side. Both apical spurs of metatibia articulated, wide, lanceolate and curved. Protarsal segments 1–4 semicylindrical, elongated with enlarged apex, but not concave on ventral surface. Tarsal claws clearly dentate, with apical tooth nearly as long as posterior one (Fig. 21). Ventral genital plates well sclerotized, symmetrical, rounded with wide apical borders; dorsal genital plates ovate, with slightly projected rounded apex (Fig. 22). Total body length: 20.0 mm. Humeral width: 8.4 mm.

Paratype variation.—Male similar to holotype except in total body length: 18.6–19.3 mm, humeral width: 7.6–8.0 mm, dorsal color of some specimens darker than holotype or with the pruinose vestiture more or less dense. Female similar to allotype except as follows: frons and pygidium with

more punctures; total body length: 19.5–20.3 mm; humeral width: 8.3–8.4 mm.

Type series.—Described from 4 ♂, 3 ♀. Holotype ♂ INBio: Costa Rica: Estación Pitilla, 9 km S Sta. Cecilia, P.N. Guanacaste, Guanacaste, Costa Rica, V-94, 700 m, C. Moraga. Allotype ♀ INBio: same data except III/IV-93, Malaise. Paratypes INBio, MXAL: same data as holotype (3 ♂, 2 ♀).

Type locality.—Estación Pitilla, 9 km S Santa Cecilia, Guanacaste National Park, province of Guanacaste, Costa Rica (approx. 10°59'26"N; 85°25'40"W).

Biological data.—Males and females of *P. guanacasteca* were collected at lights near deciduous tropical forest located at 700 m. Phenology: March–April (1), May (6). Other species of *Phyllophaga* flying at the same time were *P. hondurasana* Moser and *P. guapiles* Saylor.

Remarks.—*Phyllophaga guanacasteca* does not belong to any species group defined by Morón (1986). Its general appearance suggests a relationship with *P. (Phytalus) pruinosus* (Blanchard), but the articulated lower metatibial spur in the male, and the dentate tarsal claws of the female do not match with the diagnostic characters of the group *pruinosa*. The shape and details of the male genital capsule (Figs. 19–20) and female genital plates (Fig. 22), length of lower metatibial spur of male, sculpture of the pygidium and sternites and shape of protarsal claws (Fig. 17) will aid in the recognition of this new species.

Etymology.—Specific epithet derived

from the name of the province of Guanacaste, to which this species appears to be restricted.

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